

expected were they due to the progressive evaporation of the large original lake.

In tracing back the history of this interesting topography, we are first brought face to face with the fact that the area of the Great Basin has within recent geological times been subject to powerful and long-continued subterranean movements. In numerous cases, rocks have been fractured and displaced to an extent of 4000 or 5000 feet. So recent are some of the fractures that they actually cut through the alluvial cones that stream out from the base of the mountains, and in numerous instances displace the terraces of the old lake to the extent of 50 or 60, or sometimes even 100 feet. There seems no reason to dispute the conclusion to which Mr. Russell and his colleagues have come, that the movements are actually still in progress, and that the constant occurrence of hot springs along the lines of recent fracture may be taken as evidence of the conversion of the subterranean movement into heat.

What may have been the topography of the region before the first depression and isolation of the Great Basin is still unknown. Doubtless the ground had undergone extensive denudation as well as great subterranean disturbance. Considerable irregularities of surface would also necessarily be produced by the intermittent discharge of volcanic rocks. When this uneven floor sank below the level of the surrounding tracts so as to become a basin of inland drainage, a magnificent series of lakes was established. Of these the largest, to which the name of Lake Bonneville has been given, and of which the Great Salt Lake is the diminished representative, covered an area of not less than 19,750 square miles. Lake Lahontan was of hardly inferior dimensions, these two hydrographic basins occupying the whole breadth of the Great Basin in the latitude of the 41st parallel. No fewer than fifteen other smaller basins have been discovered, which, though now either dry or partially covered with saline or alkaline waters, were well-filled lakes at a former period.

It is some years since Mr. Gilbert, from a study of the deposits left by Lake Bonneville, announced his conclusion that they bear testimony to a remarkable oscillation of climate between humidity and aridity. Similar deductions have now been drawn from the deposits of Lake Lahontan. Previous to the appearance of this body of water the climate is believed to have been at least as dry as it is at present, when alluvial cones were pushed outwards from the base of mountains into the area of the future lake. Then came a moist period, when the hollow of Lahontan was filled up with water to a depth of 500 feet above its present desiccated floor in the Carson Desert. At or about this height the water must have stood a long time, for it has deposited, along its rocky margin and round its islets, a thick mass of calcareous tufa. That the water, if not fresh, was at least not so saline as to be inimical to life, is shown by the abundant occurrence in it of fresh-water gasteropods. An epoch of aridity ensuing, the lake fell to so low a level as to become intensely bitter and alkaline, depositing thickly along its margin crystals, six or eight inches long, of gaylussite (a hydrated carbonate of soda and lime). The soda of these crystals having been subsequently removed, the deposit is one of tufa, mainly composed of calcareous pseudomorphs after gaylussite. Next followed a period of increased precipitation, when the lake rose to within 200 feet of its highest level, and when the thickest and most abundant of the tufa deposits of the region was laid down to a depth of sometimes 20 or even 50 feet. This third incrustation of tufa was formed mainly along the rocky shores and islands; but curious mushroom-like protuberances of it likewise gathered upon stones lying on the floor of the lake. The water then rose to the highest level it ever reached, since which time the climate has again become arid. From the fact that the isolated lakes of

the Lahontan Basin are not the saturated alkaline and saline solutions which they would certainly have been had they resulted from the evaporation of such a sheet of water as that in which the three tufa terraces were elaborated, it is inferred that the whole of the original lake was evaporated to dryness, and that its alkalies and salts, having been precipitated at the bottom, were covered over with a layer of mud so as to be partially protected from rapid solution. The existing lakes may thus be supposed to be the result of a subsequent diminution of the extreme aridity, but the time within which they have been in existence has not been long enough to enable them to become as bitter and saline as the original lake.

Such are some of the views which renewed exploration of this weird region has suggested to the able surveyors who have undertaken its investigation. Mr. Russell's report, lucid and interesting as it is, must be regarded as merely a prelude to the fuller results which he and his colleagues are gathering for the good of science, and to the credit of the admirably organised and administered Geological Survey of the United States.

NOTES

PROF. FLOWER, F.R.S., will preside at a meeting which it is proposed to hold on Tuesday next, July 1, in the lecture-room of the Natural History Museum, when Mr. R. Bowdler Sharpe will read a paper on the expediency or otherwise of adopting trinomial nomenclature in zoology. Many British naturalists have been anxious to meet the distinguished American naturalist, Dr. Elliott Coues, who is now on a visit to this country, and to exchange views with him on the subject of nomenclature. Invitations have been sent to a large number of the leading British zoologists, and an interesting discussion is expected.

THE Prince of Wales, President of the City and Guilds of London Institute, opened the Central Institution, Exhibition Road, yesterday afternoon at four o'clock. The Education Section of the International Health Exhibition, in the south wing of the Central Institution, was opened at the same time.

THE following additional donations to the Equipment Fund of the Central Institution of the City and Guilds of London Institute have been voted in response to the appeal of the Prince of Wales:—The Goldsmiths' Company, 4000*l.* (subject to confirmation); the Salters' Company, 525*l.*; the Cordwainers, 250*l.* The Plasterers have increased their annual subscription from 50 guineas to 100*l.*

It is stated that the English Foreign Office is endeavouring to obtain the co-operation of the German Government in the International Educational Conference to be held at the South Kensington Health Exhibition about the middle of August. The Committee attaches special importance to the attendance of representative German pedagogues (this word being used in the higher and German sense) at this conference to read or communicate papers especially on the subjects of technical and secondary education and the organisation of universities; and it is particularly anxious to know, as early as possible, the names of any Germans of note who may be disposed to attend, and the subjects likely to be selected for papers.

A LARGE and influential deputation, including the Earl of Rosebery, the Earl of Fife, Mr. Stephen Williamson, M.P., Hon. R. P. Bruce, M.P., Prof. Cossar Ewart, Prof. Macintosh (St. Andrew's), a number of Scotch M.P.'s, and other gentlemen, waited last Monday on the Home Secretary with the view of impressing on the Government the importance of granting further funds to the Scottish Fishery Board to further scientific investigation into the habits of herring and other food fishes. The principal lines of proposed inquiry are: (1) The examination of the spawning beds around the Scottish coast with the

view of increasing the fishing, more especially on the west coast ; (2) the further collection of material for determining the nature of the food of the useful fishes met with on the Scottish coast ; (3) the further investigation of the percentage of immature herring and other food fishes destroyed under present methods of fishing ; (4) the investigation of the influence of sea-birds, parasites, &c., on the supply of food fishes ; (5) the study of the development, rate of growth, and general life history of the herring and other economic fishes, and the further study of the spawning process, and the nature of the eggs of fish ; (6) the determination of the best means of restocking deserted fishing grounds, by artificial cultivation or otherwise, of herring, cod, flat fish, &c. ; (7) the determination of the practicability of increasing the supply by artificial means of lobsters, mussels, oysters, and other shell fish ; (8) the inquiry as to the influence of fungi and other minute organisms in destroying the life of useful fishes, and the conditions which predispose to the attacks of these organisms. The Board estimates that a sum of at the very least 1000*l.* will be required during 1884-85 in order to carry on such inquiries properly. It would also immensely facilitate matters if the sailing cruiser belonging to the Board were superseded by a steam-vessel of somewhat larger size, and H.M.S. *Jackal* replaced by a seaworthy boat adapted for the work of a fishery cruiser. It is also of importance that the Admiralty should encourage and take part in scientific researches, not only on our own coasts but all over the world. Comparatively little has been done by Great Britain for the furtherance of our knowledge of the nature and habits of fish on her coast, important as these are as articles of food and commerce. The Board confidently anticipates that with the assistance now asked the investigations would yield most excellent results, as the Board is already an institution with a large staff of intelligent officers capable of making observations, collecting materials, &c., as several distinguished naturalists and the scientific members have promised to assist it gratuitously, and, moreover, that the exertions already made have yielded results of the highest promise. The deputation was most favourably received.

THERE has been considerable alarm recently with reference to the parasites in that useful and plentiful fish, mackerel ; so much so that Prof. Huxley has thought it advisable to write a letter to Mr. J. L. Sayer of Lower Thames Street, showing that any such alarm is unnecessary :—"It is perfectly true," he writes, "that mackerel, like all other fish, are more or less infested by parasites, one of which, a small thread-worm, is often so abundant as to be conspicuous when the fish is opened. But it is not true that there is any reason to believe that this thread-worm would be injurious to a man, even if he swallowed it uncooked and alive, and to speak of it as a possible cause of cholera is sheer nonsense. I have no doubt that the 'excessive use of mackerel and mild ale,' whether separately or in combination, would be followed by unpleasant results, not only at this season of the year but at any other. But I undertake to say that the consequences would be the same whether the fish contained thread-worms or not. It is very much to be regretted that the food-supply of the people should be diminished, and that the fishing population should be robbed of the fruit of their labours by the authoritative propagation of statements which are devoid of foundation ; and if you think the publication of this letter will be of any use to the public and to the fishing interest, it is at your service."

A *conversazione* will be held at the International Health Exhibition by the Council of the Society of Arts, in conjunction with the Executive Council of the Exhibition, on Wednesday, July 9. The whole of the buildings will be open, and the gardens will be illuminated.

THE Council of the Society of Arts have awarded the Society's Silver Medals to the following readers of papers during the

Session 1883-84 :—The Most Hon. the Marquis of Lorne, K.T., for his paper on "Canada and its Products" ; Rev. J. A. Rivington, for his paper on a "New Process of Permanent Mural Painting, invented by Joseph Keim" ; C. V. Boys, for his paper on "Bicycles and Tricycles" ; Prof. Fleeming Jenkin, F.R.S., for his paper on "Telpherage" ; I. Probert, for his paper on "Primary Batteries for Electric Lighting" ; H. H. Johnston, for his paper on "The Portuguese Colonies of West Africa" ; Prof. Silvanus P. Thompson, for his paper on "Recent Progress in Dynamo-Electric Machinery" ; Edward C. Stanford, F.C.S., for his paper on "Economic Applications of Seaweed" ; W. Seton-Karr, for his paper on "The New Bengal Rent Bill" ; C. Purdon Clarke, C.I.E., for his paper on "Street Architecture in India." Thanks were voted to the following Members of Council for the papers read by them :—W. H. Preece, F.R.S., vice-president of the Society, for his paper on "The Progress of Electric Lighting" ; B. W. Richardson, M.D., F.R.S., vice-president of the Society, for his paper on "Vital Steps in Sanitary Progress" ; Col. Webber, R.E., C.B., Member of Council, for his paper on "Telegraph Tariffs" ; B. Francis Cobb, vice-president of the Society, for his paper on "Borneo" ; J. M. Maclean, Member of Council, for his paper on "State Monopoly of Railways in India" ; W. G. Pedder, Member of Council, for his paper on "The Existing Law of Landlord and Tenant in India."

THE Italian Government proposes to found a central magnetic observatory at Rome, to be placed under the direction of the Meteorological Office. The Government asks for a vote of 176,000 francs, in addition to an annual sum of 5550 francs for general expenses, and 11,500 francs for *personnel*.

THE *Times* Berlin correspondent, telegraphing on Thursday last, states that the reddish-brown atmosphere and the peculiar appearance of the sun and sky which were noticed last year, especially in November, reappeared on the previous evening almost as vividly as ever.

THE results of the analyses made at the Municipal Laboratory of Paris are so satisfactory that tradesmen of that city are holding indignation meetings on behalf of the liberty of watering their liquors and mixing the different kinds of wine. It is needless to state that the public and the administration are equally hostile to any alterations being made in the existing law. But greater precision will now be introduced into the verdict of the experts, and when they declare any liquor to be bad they will state whether it is by adulteration, or alteration of its primitive elements, or mixing with inferior sorts. The development of the institution is so important that forty persons are now engaged in this kind of work. Similar institutions have been created in provincial cities, and a central administration established in Paris. The late M. Wurtz was the head of this useful Bureau ; his place is now filled by M. Berthelot.

THE Russian Admiralty has under consideration a plan for an expedition to the North Pole, with a view to benefit by the experience gained by the *Jeannette* disaster. The expedition is proposed to start from the Jeannette, Bennet, and Henriette Islands, where large depots will be established. The journey will be continued thence to Franz-Josef Land by steamer, and further northwards by sledges and on foot. The expedition would be divided into three parties, the first of which would act as a kind of vanguard, the two following not moving forward until suitable camping places had been found and depots established. This system would make the progress safe and systematic. It is estimated that the expedition would require three years to reach the Pole and to return to Northern Siberia. The expenses of the same will probably be covered by a national subscription, the Government, and the Russian Geographical Society.

THE Prussian Government having requested the Swedish to effect measurements of the tide, &c., on the Swedish coasts in the Baltic, similar to those which for some time have been carried out on the Pomeranian coast, Capt. Malmberg and Prof. Rosen have been commissioned to visit the German stations during the summer, and select the most suitable places on the Swedish coast for realising this proposal.

THE Norwegian Storting has voted the entire sum proposed for scientific and literary purposes—about 5000*l.* Among these we note 150*l.* to the *Technical Journal*, 350*l.* to Dr. Norman's "Flora," 60*l.* to Dr. Sophus Tromholt for prosecuting his auroral researches, 50*l.* each to the *Acta Mathematica* and the "Fauna litoralis Norvegiæ."

AT Weimar, Munich, Elberfeld, and some other German towns have been erected what are called "pyramids of instruction." They show on their various faces the elevation of the place above the level of the sea, the population, the difference of local time from that of Vienna, Paris, London, New York, &c. There are also a clock, barometer, thermometer, vane, and a variety of statistical information.

MR. H. W. EATON of Louisville, Kentucky, writes to *Science* that the *Commercial* of that city for May 17 and 18 gave accounts of a tailed child recently born there. As such cases are of scientific interest, and are very rare, a party of four, including a prominent doctor and Mr. Eaton, concluded to investigate the case. "We found a female negro-child, eight weeks old, normally formed in all respects, except that slightly to the left of the median line, and about 1 inch above the lower end of the spinal column, is a fleshy pedunculated protuberance about 2½ inches long. At the base it measures 1½ inch in circumference. A quarter of an inch from the base it is somewhat larger, and from that it tapers gradually to a small blunt point. It closely resembles a pig's tail in shape, but shows no sign of bone or cartilage. There seems to be a slight mole-like protuberance at the point of attachment. The appendage has grown in length about a quarter of an inch since the birth of the child. The mother, Lucy Clark, is a quadroon, seventeen years old, and the father a negro of twenty,—both normally formed. In Darwin's 'Descent of Man,' vol. i. p. 28, he speaks of a similar case, and refers to an article in *Revue des Cours Scientifiques*, 1867-68, p. 625. A more complete article is that by Dr. Max Bartels, in *Archiv für Anthropologie* for 1880. He describes twenty-one cases of persons born with tails, most of them being fleshy protuberances like the one just described."

ON May 27, at about 8.45 p.m., immediately after sunset, a magnificent meteor or fireball was seen at Skonevik, on the west coast of Norway. It went in a perfectly horizontal line to north-north-west, leaving a bright tail behind appearing like steam. This trail was distinctly observable for quite five minutes, when it gradually spread in the shape of a light cloud, which was soon hidden in the approaching darkness. About two minutes after the ball had passed out of sight a loud report was heard in the same direction; it was very much like ordinary thunder heard from a distance, with the exception of its lasting twice as long. The sky was perfectly clear, and several persons witnessed the phenomenon. The meteor was also observed in the Kvinherred parish.

ANOTHER "blue grotto," or, rather, series of three large grottoes, 87 metres in length, has been discovered on the Dalmatian island of Buoi, lying to the south-west of Lissa. The cave is described by its discoverer, Baron Ramsonnet, Austrian Secretary of Legation, as surpassing the famous Capri Grotto.

THE additions to the Zoological Society's Gardens during the past week include two Macaque Monkeys (*Macacus cynomolgus* ♀ ♀) from India, presented respectively by Mr. Howard

Lane and Madam Kettner; two White-fronted Capuchins (*Cebus albifrons* ♂ ♀) from South America, presented by Mr. Messum; a Coypu (*Myopotamus coypus*) from South America, presented by Mrs. Constance Keely; a Harpy Eagle (*Thrasaetus harpyia*) from South America, a Red-billed Tree Duck (*Dendrocygna autumnalis*) from America, presented by Capt. H. King; a White-tailed Buzzard (*Buteo albicaudatus*) from America, presented by Mr. Lewis; a Wedge-tailed Eagle (*Aquila audax*) from Queensland, presented by Mr. Henry Ling Roth; two Choughs (*Pyrrhocorax graculus*), British, presented by Mr. J. Compton Lees; a Gray-breasted Parakeet (*Bolborhynchus monachus*) from Monte Video, presented by Mrs. Moore; two Cape Crowned Cranes (*Baalcarica chrysopelargus*) from South Africa, presented by Mr. J. R. Chapman; a White Stork (*Ciconia alba*), European, presented by Mr. Hubert D. Astley; a Partridge (*Perdix cinerea*), British, presented by Mr. George Rubie; a Blue and Yellow Macaw (*Ara ararauna*) from South America, deposited; a Brush-tailed Kangaroo (*Petrogale penicillata*) from New South Wales, four White Storks (*Ciconia alba*), three European Pond Tortoises (*Emys europæa*), European, a Common Boa (*Boa constrictor*) from South America, purchased; a Black-necked Swan (*Cygnus nigricollis*) from Antarctic America, received in exchange.

OUR ASTRONOMICAL COLUMN

THE OXFORD UNIVERSITY OBSERVATORY.—The Savilian Professor of Astronomy has issued his Annual Report to the Board of Visitors of the University Observatory, which was read on the 5th of the present month, and forms a supplement to No. 493 of the *Oxford University Gazette*. The attendance of students at the lectures has been greater than at any previous time, and the Professor mentions "the phenomenon" of the regular appearance of two ladies at his lectures on the planetary and lunar theories, at the same time reminding the Board what even the approximate mastery of such theory implies.

On the astronomical work of the staff of the institution during the year, Prof. Pritchard's Report is a most favourable one. He refers to three memoirs on important astronomical questions which have issued therefrom, and which have been printed in the *Memoirs* of the Royal Astronomical Society. These include an extensive memoir by himself on the "Photometric Determination of the Relative Brightness of the Brighter Stars North of the Equator," in which his work at Cairo is brought to bear, and a memoir by the first assistant, Mr. W. E. Plummer, on the probable motion of the solar system in space, the data for which depend upon Mr. Stone's recent catalogue of southern stars; it is a memoir very similar in character to the well-known one by the late Mr. Galloway. Further, Prof. Pritchard has communicated to the Royal Astronomical Society a paper which was read at the last meeting, demonstrating, as he thinks, the existence of small displacements among the Pleiades. Upwards of a thousand measures of the relative brightness of stars were made, leaving about the same number to be made in the next year. This measurement of all the naked-eye stars from the Pole to the Equator will furnish a *Uranometria Nova Oxoniensis*, and Prof. Pritchard hopes that its publication may be undertaken by the University Press. The measures of the Pleiades having been completed, he now intends to devote himself to lunar work—the determination of selenographical longitude and latitude of a large number of points on the moon's surface by means of a valuable series of lunar photographs at the Observatory. Reference is made, in addition to the Pleiades work, to the existence of measures of some 250 stars in another cluster made at the Observatory a few years since, and to be shortly reduced and published; the particular cluster is not indicated in the Report, but presumably may be M. 39 in Cygnus, described by Messier when he observed it in 1764 as "a star-cluster of 1° diameter."

VARIABLE STARS.—In a communication to the Liverpool Astronomical Society Mr. Baxendell notifies that his determinations of the times of eight maxima between 1861 October 16 and 1881 November 21 are not satisfied by a constant period, but that, dividing them into two groups, he obtains the following results:—